appliance for procuring upper air readings, as Professor McAdie had been placed on duty in San Francisco.

November 16, 1895. The first thermoanemograph was put into use.

November 18, 1895. Professor Marvin was officially directed to construct appliances for carrying meteorological instruments into the upper air, and to give attention to the construction of the necessary instruments. The first step taken by Professor Marvin was to abandon the use of twine for kite lines.

December 7, 1895. The diamond kite was publicly flown by Mr. Potter at the Weather Bureau.

December 20, 1895. Phosphor bronze was used for the kite line and a wooden reel was employed.

January 7, 1896. In order to scientifically compare the flying qualities of different kinds of kites, methods were devised for regularly observing the angle of flight and angle of incidence to the wind, the latter being obtained by means of a scale of division in bold lines stencilled on the cloth of the kite, and viewed from the reel by aid of a small telescope with graduated vertical circle.

January 10, 1896. The properties of the catenary as applied to the science of kiteflying were fully developed and tables of results computed.

January 24, 1896. The advantage of using a small motor attached to the line below the kite was considered and discussed.

January 27, 1896. Music wire was substituted for cord, and was used exclusively for the kite line thereafter. During this month waterproof kites were employed in rain or snowstorms.

February 4, 1896. Steel music wire was substituted for the bronze wire and subsequently used exclusively for the kite line.

February 13, 1896. Apparatus was devised and installed for testing the strength of wire, string, splices, etc. An improved style of splice was developed and tools devised for making such splices expeditiously.

March 5, 1896. Early in the tests of kites the marked inefficiency due to the fluttering of the cloth and looseness at the edges was noticed. On the above date a kite with the frame construction located entirely at the edges of the cell was completed and tested with very satisfactory results. This improved feature was ultimately used exclusively, and was generally adopted elsewhere in all high grade kites.

March 21, 1896. Recognizing that the greater part of the pulling power exerted by the wind upon a kite is concentrated in the front cell, a Hargrave kite with three planes in both front and rear cells was made and tested. Subsequently the third plane was omitted from the rear cell, and at this point of the work a great variety of structures were made and tested for the purpose of determining how much the surface and extent of the rear cell might be diminished. It was recognized that the prime function of this part of the kite was that of controlling and maintaining the equilibrium. Structural and constructural considerations, however, led to the adoption of the simple Hargrave kite, with three horizontal planes in the forward cell and two in the rear.

April 4, 1896. A Richard meteorograph of aluminum, recording pressure, temperature, and humidity, was used.

April 13, 1896. A height of one kilometer above the hill was attained for the first time.

July 20, 1896. A height of 1.8 kilometers, or over one mile, was reached.

July 23, 1896. A tail composed of hollow cones was attached to one of the kites at the suggestion of Mr. Douglas Archibald.

August 1, 1896. The height of 2000 meters was reached.

October 8, 1896. The height of 2665 meters, probably the greatest to which a kite had attained up to that date, was reached.

February, 1897. To facilitate the use of a greater length of line under continued strain, a new windless with a strain pulley controlled by a steam engine was constructed. During this year important modifications of the meteorograph were made and new forms of kites tested.

February 3, 1897. Safety line devised and used in ascensions.

April 21, 1897. Ascensions at Washington with thermograph on kite were continued more or less regularly on every favorable day from this date until June.

June 11, 1897. Design completed of the hand and power kite reels afterward employed by the Weather Bureau.

August 7, 1897. Drawings and specifications of the improved kite meterograph of the Marvin design were sent to contractors.

September 20, 1897. The construction of a collapsible, three plane kite of the standard type for station use was begun, to serve as a model for the use of contractors in manufacturing kites for station supplies.

October 15, 1897. The meteorograph was raised to a height of 3379 meters above the hill or 3599 meters above the valley.

March 3, 1898. The automatic power kite reel for use at the Washington station and also the hand reels for the equipment of outlaying stations had been completed. Each one of these was separately filled with wire and calibrated, in order to give the length unwound during ascensions. All other details of the equipment for stations were also completed about this time, and shortly thereafter the instruction of observers employed to fly kites at stations began.

April, 1898. Systematic ascensions were begun at seventeen kite stations, established in different parts of the country.

1899. The Weather Bureau issued Bulletin F, by Prof. H. C. Frankenfield, containing a report of the kite observations of 1898.

August, 1901. Mr. Rotch was the first to use a steamer to raise a kite on a calm day.—*F. O. S.*

STORM ON THE PACIFIC COAST, DECEMBER 27-31, 1904.

A steep barometric gradient on the northern Pacific coast during the last days of the month was accompanied by notably high winds and heavy precipitation at several points. On the 28th an area of low pressure was central at North Head, Wash., with a reduced reading of 29.7 inches, with a high area to the southeast. The low developed rapidly in intensity during the next twenty-four hours, and the reduced pressure on the morning of the 29th ranged from 29.0 inches at Tatoosh Island to 30.0 inches at San Francisco and in the neighborhood of Boise, Idaho, a gradient of one inch in about 530 miles. The pressure then rose slowly as the low moved eastward. The influence of topography on wind velocity is well shown by the records from the various stations. The time given is 75th meridian.

At San Francisco the maximum wind velocity was 38 miles from the south on the 30th, and moderate rains fell on the 29th, 30th, and 31st. At Southeast Farallon, a small island 30 miles due west of San Francisco, occasional light rains fell on the 27th, 28th, and 29th, with heavier precipitation beginning at 9:15 p. m. on this date. On the 27th the observer notes that the sea was unusually smooth all day, without surf. High wind began on the 28th, reaching a velocity of 49 miles from the south on the following day. Conditions on the 30th and 31st are described in the following extracts from the daily journal of the Assistant Observer in Charge, Mr. E. C. Hobbs:

December 30.—Cloudy; falling barometer until 3:15 p. m., followed by sudden and rapid rise. Wind veered from south to northwest and velocity dropped from 48 to 15 miles in fifteen minutes. Rain ended at 10 p. m.; amount, 1.35 inches.

Gale raged furiously up to 3:15 p. m.; maximum velocity of 58 miles from the south occurred at 8:45 a. m. Communication with Professor

McAdie being still interrupted, the southeast storm warning was continued until 3:15 p. m., when, it being evident that the storm had spent its fury, the warning was taken down.

This has been the most severe storm since last March. The night was a pandemonium of roaring winds, thundering surf, and driving rain. The noise prevented sleep, and the observer kept a close watch on the self-register during the entire night. All went well until the observers were at breakfast, when the anemometer broke down completely, some parts of it being blown away. Assistant Observer, Mr. James Jones, volunteered to mount the extra instrument, and a hard two or three hours followed. The extra instrument also soon showed signs of distress, and it was only by combining parts of both instruments and making some repairs that the record was started again.

Mr. Jones must have ascended the anemometer support at least a dozen times in a drenching rain, with a wind blowing between 50 and 60 miles per hour. His action was very commendable.

The east end of the bridge was wrecked again by the wind and surf, cutting off communication with the east end of the island.

December 31.—Clear; rising barometer; wind from the northwest freshened during the night, blowing a gale from 3:50 a. m. to 11 p. m. Maximum velocity of 40 miles from the northwest at 7:25 a. m. Amount of rainfall, trace. Clear in the evening.

Point Reyes Light, 30 miles northeast of the island, experienced high winds on the 29th and 30th, with a maximum of 80 miles per hour from the south at 1:25 p. m. The velocity then decreased rapidly to 25 miles, veering to the northwest at 2:45 p. m., and increasing to a maximum of 52 miles from that direction at 6:10 a. m. of the following morning. Precipitation amounted to 1.77 inches.

At Eureka, Cal., the highest wind velocity was 29 miles and the precipitation amounted to 3.92 inches, of which 3.65 inches fell in the twenty-four hours ending at 7:40 a. m. on the 30th. This was the heaviest 24-hour rainfall in any December since the station was established in 1887.

A similar heavy rainfall of 3.89 inches at Roseburg, Oreg., between 2 a. m. of the 29th and 2 a. m. of the 30th, is, with one exception, the greatest amount in twenty-four hours in the records of that station, which was established in 1877. The total precipitation at Roseburg was 4.68 inches, and the winds generally light, reaching a maximum of nineteen miles from the southeast on the night of the 28–29th, but not rising above nine miles per hour during the remainder of the month.

At North Head, Wash., strong winds from southeast to southwest prevailed from the 28th to the 31st, with maximum velocities of 74, 85, 46, and 48 miles, respectively, on those dates, and an average velocity during the 29th of 48 miles per hour. Nothing approaching these figures was reported from Portland, Oreg., or Seattle, Wash., where the maximum velocities were 22 and 29 miles, respectively, with averages on the 29th of about eight miles at the former station and six miles at the latter. The total precipitation was as follows: North Head, 3.28; Portland, 2.71; Seattle, 2.51.—*F. O. S.*

CORRIGENDA.

Monthly Weather Review for November, p. 514, column 2, 2d line from bottom, for "W C" read "W to C"; p. 515, column 2, 15th line from bottom, for "Meteorology" read "Mechanics."

THE WEATHER OF THE MONTH.

By Mr. WM. B. STOCKMAN, Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure is graphically shown on Chart VIII and the average values and departures from normal are shown in Tables I and VI.

The mean pressure for the month was highest over the middle Plateau region and lowest over New England.

The mean monthly pressure was above the normal in North Dakota, northwestern Minnesota, eastern South Dakota, the Pacific districts, except on the coast of Washington and extreme southern California, the middle and southern Plateau and southern slope regions, portions of the middle slope region and west Gulf States, and southern Florida; elsewhere it was below the normal.

The greatest excess in pressure occurred in New Mexico and southwestern Colorado, and the greatest deficiency over the central Mississippi Valley, Ohio Valley, lower Lake region, Middle Atlantic States, and northern portion of the South Atlantic States.

The mean pressure for the month increased over the preceding month in the Atlantic, Gulf, and Pacific States, eastern lower Lake region, and western portions of the Plateau. In all other sections the mean pressure diminished, the most marked changes occurring over the middle slope region.

TEMPERATURE OF THE AIR.

The distribution of maximum, minimum, and average surface temperatures is graphically shown by the lines on Chart V.

The mean temperature for the month was generally below the normal east of the slope regions, and in north-central California, and above normal in the remaining districts.

In southeastern Texas, lower Missouri Valley, eastern middle slope region, northern portion of the South Atlantic States, Middle Atlantic States, New England, Lake region, and northern portion of the upper Mississippi Valley the changes were quite marked and ranged from —2° to —10°, the greatest deficiencies occurring in the northeastern portion of the Middle Atlantic States and in New England.

The most marked positive departures occurred over southern California, northern slope, and eastern portion of the northern Plateau regions, where they ranged from +2° to somewhat more than +4°.

The mean temperature was the lowest by 1° during any December since the establishment of the station at Block Island, R. I., Eastport, Me., Harrisburg, Pa., Nantucket, Mass., and Syracuse, N. Y.; as low as the lowest at Binghamton, N. Y., Modena, Utah, North Head, Wash., Richmond, Va., and Scranton, Pa.

The average temperatures for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	22.3	— 7.6	—31.6	— 2.6
Middle Atlantic	12	31.2	— 5.0	—25.6	— 2.1
South Atlantic	10	46.3	— 1.6	—13.3	— 1.1
Florida Peninsula*	8	60.8	— 0.4	+ 0.8	+ 0.1
East Gulf	9	49.8	— 1.0	— 3.4	— 0.3
West Gulf	7	49.9	— 1.5	+ 7.2	+ 0.6
Ohio Valley and Tennessee	11	35.4	— 2.4	—16.1	— 1.3
Lower Lake	8	25.4	— 5.1	—27.2	— 2.3
Upper Lake	10	21.1	— 3.2	—21.7	— 1.8
North Dakota*	8	15.4	+ 1.2	— 5.2	— 0.4
Upper Mississippi Valley	11	27.4	— 1.0	—15.1	— 1.3
Missouri Valley	11	27.4	— 1.3	+ 0.3	0.0
Northern Slope	7	27.1	+ 2.6	+18.3	+ 1.5
Middle Slope	6	33.6	— 1.3	+11.3	+ 0.9
Southern Slope*	6	40.6	— 1.0	+14.5	+ 1.2
Southern Plateau*	13	39.6	— 0.1	+ 3.4	+ 0.3
Middle Plateau*	8	29.3	+ 1.8	+ 7.3	+ 0.6
Northern Plateau*	12	32.3	+ 0.2	+26.7	+ 2.2
North Pacific	7	43.6	+ 1.7	+ 9.0	+ 0.8
Middle Pacific	5	48.7	— 0.1	+ 8.2	+ 0.7
South Pacific	4	55.0	+ 2.2	+16.2	+ 1.4

* Regular Weather Bureau and selected voluntary stations.

Maximum temperatures of 80°, or higher, occurred in Florida, southern and western Louisiana, southeastern Texas, and portions of the southwestern parts of Arizona and California.

The maximum temperature equaled the highest on record at Cheyenne, Wyo., and Pensacola, Fla., and exceeded it by 2° at North Platte, Nebr., and by 4° at Valentine, Nebr.